

GOVERNMENT SCIENCE COLLEGE, GADCHIROLI
DEPARTMENT OF BOTANY

**Program outcomes, Program specific outcomes and
course outcomes of Botany**

Subject specific outcomes	<ul style="list-style-type: none">• Students will gain knowledge and learn techniques in Plant sciences.• They will understand the difference between Prokaryotic and Eukaryotic cell, its functions in control and regulation of various metabolic pathways of organisms.• Analyze complex interactions among the Plants, Microbes and Animals, understands the evolutionary aspects of Plants.• Their distribution and relationship with the environment and interaction with other organisms.• Understands the Basic Life forms from Cryptogams to Phanerogams.• Understand the Physiological and Developmental processes of Plants• Gain knowledge of Agro Forestry/Pharmacognosy /Gardening/ Mushroom /biofertilizers etc to develop entrepreneur attitude.• Understands about various concepts of Genetics, Taxonomy, Ecology, Molecular biology, Tissue Culture and Its applied aspect.
Program specific outcomes	<ul style="list-style-type: none">• Understand the nature and basic concepts of cell biology, genetics, molecular biology, taxonomy, physiology, ecology, diseases, disease spreading agents and applied Botany• Understand the relationships among Plants, plants and microbes• Perform experiments as per laboratory standards in the areas of Taxonomy, Physiology, Ecology, Cell biology, Genetics, molecular Biology, Plant biotechnology and Plant Tissue Culture.• Qualitative approach has been made to crack the different State and National level exam concern with Plant Sciences/Life sciences.• Gains knowledge about research methodologies, effective communication and skills of problem solving methods

GONDWANA UNIVERSITY, GADCHIROLI
CBCS COURSES IN B. SC.BOTANY

SEMESTER - I

PAPER CODE	CORE PAPER	TITLE OF THE PAPER	CREDIT
	I	PLANT DIVERSITY I (MICRO-ORGANISMS, ALGAE, FUNGI AND PLANT PATHOLOGY)	02
	II	PLANT DIVERSITY II (BRYOPHYTA PTERIDOPHYTA, GYMNOSPERMS AND PALEOBOTANY)	02
	PRACTICAL	BASED ON THEORY PAPER I & II	02

SEMESTER - II

PAPER CODE	CORE PAPER	TITLE OF THE PAPER	CREDIT
	III	MORPHOLOGY AND ANATOMY OF ANGIOSPERMS	02
	IV	TAXONOMY AND DIVERSITY OF ANGIOSPERMS	02
	PRACTICAL	BASED ON THEORY PAPER III & IV	02

SEMESTER- III

PAPER CODE	CORE PAPER	TITLE OF THE PAPER	CREDIT	SEC
	V	REPRODUCTIVE BIOLOGY OF ANGIOSPERMS, PLANT GROWTH AND DEVELOPMENT	02	ENVIRONMENTAL STUDIES
	VI	PLANT BIOCHEMISTRY AND PHYSIOLOGY	02	
	PRACTICAL	BASED ON THEORY PAPER V & VI	02	

SEMESTER- IV

PAPER CODE	CORE PAPER	TITLE OF THE PAPER	CREDIT	SEC
	VII	CELL BIOLOGY, GENETICS AND BIOTECHNOLOGY	02	ENVIRONMENTAL STUDIES
	VIII	PLANT ECOLOGY	02	
	PRACTICAL	BASED ON THEORY PAPER VII & VIII	02	

SEMESTER -V

PAPER CODE	CORE PAPER	TITLE OF THE PAPER	CREDIT
--	IX DISCIPLINE SPECIFIC ELECTIVE (DSE)	MOLECULAR BIOLOGY –I	02
--	X DISCIPLINE SPECIFIC ELECTIVE (DSE)	MOLECULAR BIOLOGY –II	02
--	PRACTICAL	CORE COURSE IX & X	02

--	SKILL ENHANCEMENT COURSE (SEC)	GARDENER TRAINING –(BASIC)	02
		MUSHROOM CULTURE TECHNOLOGY	02
		HERBAL TECHNOLOGY	02
		HIGH DENSITY PLANTING	02
		FLORICULTURE	02

SEMESTER -VI

PAPER CODE	CORE PAPER	TITLE OF THE PAPER	CREDIT
--	XI DISCIPLINE SPECIFIC ELECTIVE (DSE)	PLANT BIOTECHNOLOGY- I	02
--	XII DISCIPLINE SPECIFIC ELECTIVE (DSE)	PLANT BIOTECHNOLOGY- II	02
--	PRACTICAL	CORE COURSE XI & XII	02
--	SKILL ENHANCEMENT COURSE (SEC)	ETHNOBOTANY	02

Scheme of Marks of Theory and Practical

Semester	Paper	Title	Marks		Total
			Theory	Internal Assessment	
I	I	PLANT DIVERSITY I (MICRO-ORGANISMS, ALGAE, FUNGI AND PLANT PATHOLOGY)	50	10	150
	II	PLANT DIVERSITY II (BRYOPHYTA PTERIDOPHYTA, GYMNOSPERMS AND PALEOBOTANY)	50	10	
	PRACTICAL	BASED ON THEORY PAPER I & II	30	-	
II	I	MORPHOLOGY AND ANATOMY OF ANGIOSPERMS	50	10	150
	II	TAXONOMY AND DIVERSITY OF ANGIOSPERMS	50	10	
	PRACTICAL	BASED ON THEORY PAPER I & II	30	-	
III	I	REPRODUCTIVE BIOLOGY OF ANGIOSPERMS, PLANT GROWTH AND DEVELOPMENT	50	10	150
	II	PLANT BIOCHEMISTRY AND PHYSIOLOGY	50	10	
	PRACTICAL	BASED ON THEORY PAPER I & II	30	-	
IV	I	CELL BIOLOGY, GENETICS AND BIOTECHNOLOGY	50	10	150
	II	PLANT ECOLOGY	50	10	
	PRACTICAL	BASED ON THEORY PAPER I & II	30	-	
V	I	MOLECULAR BIOLOGY-I	50	10	150
	II	MOLECULAR BIOLOGY-I	50	10	
	PRACTICAL	PRACTICALS BASED ON PAPER IX AND PAPER X	30	-	
VI	I	PLANT BIOTECHNOLOGY-I	50	10	150
	II	PLANT BIOTECHNOLOGY-II	50	10	
	PRACTICAL	PRACTICALS BASED ON PAPER XI AND PAPER XII	30	-	

COURSE SPECIFIC OUT COMES

B.SC. I

SEMESTER – I

PAPER CODE	CORE PAPER	TITLE OF THE PAPER	COURSE SPECIFIC OUTCOMES
	I	PLANT DIVERSITY I (MICRO-ORGANISMS, ALGAE, FUNGI AND PLANT PATHOLOGY)	<ul style="list-style-type: none"> • Describes general characteristics of life- viz, Virus, Bacteria, Mycoplasma, Cyanobacteria. • Understand the Concept of Cryptogams and Phanerogams • General characteristics, classification and economic importance of Algae, Fungi and Lichens. • Understand the representative forms in Algae, Fungi and Lichens. • Application of Botany in agriculture through study of plant pathology.
	II	PLANT DIVERSITY II (BRYOPHYTA, PTERIDOPHYTA, GYMNOSPERMS AND PALEOBOTANY)	<ul style="list-style-type: none"> • Understand the diversity of plants from Bryophytes to Gymnosperms. • General characteristics, classification and economic importance of Bryophyta, Pteridophyta and Gymnosperms. • Understand the life history from representative forms of Bryophyta, Pteridophyta and Gymnosperms. • Concept of Heterospory and seed habit • Understand the geological time scale. • The process of fossilization and types of fossils.
	PRACTICAL	BASED ON THEORY PAPER I & II	<ul style="list-style-type: none"> • Practical on handling the compound microscope, Differentiate the various groups of bacteria. • Study various life stages of representatives of Cryptogams to Gymnosperms. • Different plant diseases and causal organisms. • Types of fossil. • Study of fossil Gymnosperms

SEMESTER –II

PAPER CODE	CORE PAPER	TITLE OF THE PAPER	COURSE SPECIFIC OUTCOMES AT THE END OF COURSE STUDENTS WILL ABLE TO UNDERSTAND
	III	MORPHOLOGY AND ANATOMY OF ANGIOSPERMS	<ul style="list-style-type: none"> • Morphological modification of root, stem, leaves and floral parts and its taxonomic relevance in plant identification. • Allow the students to understand the anatomical features of angiosperms and function of various tissues in plants life. • Differentiation of tissue system in Monocot and Dicot root, stem and leaf. Anomalous secondary growth in root and stem.
	IV	TAXONOMY AND DIVERSITY OF ANGIOSPERMS	<ul style="list-style-type: none"> • Help to understand Diversity of Angiosperms and concept of Taxonomy. • Origin of Angiosperms with Bennettitalian theory • Principles and rules of Botanical nomenclature. • Classification of Angiosperms and detailed study of Bentham and Hookers system classification. • Imparts to the importance of Herbarium in Taxonomy. • Diversity of Angiosperm plants by studying the families from Dicot and monocot and economic importance of plants.
	PRACTICAL	BASED ON THEORY PAPER I & II	<ul style="list-style-type: none"> • Morphological modification of Angiosperms plants in relation to adaptation; types of tissue system; their function and role in plant life. • Study of Bentham and Hookers classification system for dicot and monocot plant. • Technique of classical and digital Herbarium preparation.

B. Sc. II**Semester III**

PAPER CODE	CORE PAPER	TITLE OF THE PAPER	COURSE SPECIFIC OUTCOMES AT THE END OF COURSE STUDENTS WILL ABLE TO UNDERSTAND
	V	REPRODUCTIVE BIOLOGY OF ANGIOSPERMS, PLANT GROWTH AND DEVELOPMENT	<ul style="list-style-type: none">• Importance of pollination and their types in reproduction of plants; developmental process of male and female gametophyte.• Stages involved in Seed development; causes of seed dormancy and its importance.• Phases of plant growth and development and how growth hormones play an important role?• Tropic and Nastic movements.• Understand the concept of photoperiodism, vernalization, circadian rhythm, senescence and abscission.
	VI	PLANT BIOCHEMISTRY AND PHYSIOLOGY	<ul style="list-style-type: none">• Understanding the concept of biomolecules- includes the carbohydrates, proteins, lipids, amino acids and enzymes and their importance, mechanism and role in physiological and biochemical processes of plants.• Importance of nitrogen in plant growth, sources of nitrogen. The process of biological nitrogen fixation and role of nitrate reductase in nitrogen metabolism. Commercial application of PGPR.• Role of mineral nutrition in plant growth and development and deficiency symptoms.• Understand the concept of Ascent of sap, Transpiration, phloem transport and theories of absorption of solutes.• Process of Photosynthesis and Respiration.
	PRACTICAL	BASED ON THEORY PAPER I & II	<ul style="list-style-type: none">• Understand the concept of Enzyme substrate complex.• structure and development of seed• phenomenon of nastic and tropic movement• Learn the methods of breaking seed dormancy.• Impart the knowledge of fermentation, imbibition, transpiration and photosynthesis.

Semester IV

PAPER CODE	CORE PAPER	TITLE OF THE PAPER	COURSE SPECIFIC OUTCOMES AT THE END OF COURSE STUDENTS WILL ABLE TO UNDERSTAND
	VII	CELL BIOLOGY, GENETICS AND BIOTECHNOLOGY	<ul style="list-style-type: none"> • Ultrastructure and function of plant cell. • Cell division to learn how cell divide by equational and reduction division. Structure of DNA and its replication. • Concept of totipotency, steps in micropropagation. • Understand the Mendelian genetics and interaction of genes. • Structure and function of Extra nuclear genome. • Knowing the effect of chromosomal aberrations. Variation in chromosome number, sex linkage and sex determination. • Application in genetic counseling and R-DNA technology.
	VIII	PLANT ECOLOGY	<ul style="list-style-type: none"> • Importance of ecology in relation to understand the plant and environment interaction. • Understand the concept of ecosystem; biotic and abiotic factors. • Biogeochemical cycle, community ecology and assessment of environmental pollution. • Plant succession and climax concept and phytogeographical regions of India. •
	PRACTICAL	BASED ON THEORY PAPER I & II	<ul style="list-style-type: none"> • Understand the ultra structure of cell. • Learn different stages of mitosis and meiosis and staining technique. Working out of law of inheritance. • Get acquainted with laboratory organization, tools of genetic engineering. • Use of various instruments. • Techniques of Plant Tissue Culture. • Ecological adaptation of plants • Method of determining the plant biomass, • Learn the water holding capacity of soil.

B. Sc. III**Semester V**

PAPER CODE	CORE PAPER	TITLE OF THE PAPER	COURSE SPECIFIC OUTCOMES AT THE END OF COURSE STUDENTS WILL ABLE TO UNDERSTAND
--	DSE (ANY ONE)	MOLECULAR BIOLOGY	<ul style="list-style-type: none">• The basic life processes in Biology• To Study the reaction at molecular level• Differentiate between Prokaryotic and Eukaryotic process• Different forms of Genetic Material• Students will understand Central dogma of Biology and Genetic code
		GENETICS AND PLANT BREEDING	<ul style="list-style-type: none">• To understand the Mendel's Law of Heredity• Non-Mendelian Inheritance.• Plant Breeding: Introduction and its objectives• Plant genetic resources & Hybridization• Gene organization & genetic code• Special types of chromosome• Role of biotechnology in crop improvement
		ECONOMIC BOTANY	<ul style="list-style-type: none">• To understand the Importance and scope of Economic Botany• Cultivation and uses of Cereals & Pulses• Vegetables, Sugars and fruits• Information of oil & Wild edible fruit plants• Information of Fibre & forage plants• Spices, condiments and beverages plants• Rubber and dye yielding plants• Timber yielding plants and Bamboo:
	SEC (ANY ONE)	GARDENER TRAINING –(BASIC)	<ul style="list-style-type: none">• To understand the Gardening, its types• Ornamental Plants• Design and layout of gardens at various places• Green house & making of bonsai
		MUSHROOM CULTURE TECHNOLOGY	<ul style="list-style-type: none">• Gives all knowledge of Mushroom Industry• Edible Mushroom & its Cultivation Technology• Storage and nutrition• Research Centers & Cost benefit ratio
		HERBAL TECHNOLOGY	<ul style="list-style-type: none">• Gives knowledge of herbal medicine ,Herbal drug & its formulations• Processing of herbal raw material• Herbal Nutraceuticals & Herbal cosmetics• Herbal excipients & Herbal Industry• Evaluation of Drugs
		HIGH DENSITY PLANTING	<ul style="list-style-type: none">• To understand Traditional farming and Forestation

			<ul style="list-style-type: none"> • High Density Planting and its applications • HDP in Forestation & Miyawaki concept
		FLORICULTURE	<ul style="list-style-type: none"> • Gives knowledge related to floriculture and landscape gardening • To understand the Nursery Management & Ornamental Plants • Principles of Garden Designs & Commercial Floriculture

B.Sc. III Semester VI

PAPER CODE	CORE PAPER	TITLE OF THE PAPER	COURSE SPECIFIC OUTCOMES AT THE END OF COURSE STUDENTS WILL ABLE TO UNDERSTAND
	DSE (ANY ONE)	PLANT BIOTECHNOLOGY	<ul style="list-style-type: none"> • To understand the Basics and techniques in Plant Tissue Culture (PTC) • Micropropagation & Secondary metabolite production in Plants • To get aware with modern Tissue Culture Techniques • Methods of gene transfer & Transgenic Crop Production • Applications of Plant Biotechnology & Transgenic plants
		PLANT DIVERSITY AND CONSERVATION	<ul style="list-style-type: none"> • To understand the Concept of Biodiversity • Its applications at various levels • Biodiversity in Terrestrial & Aquatic Environment • Biodiversity distribution • Biogeographically & Phytogeographical classification of India • Biodiversity- Threats , loss and its causes • Listing of Threatened biodiversity • Conservation and Prevention Acts • In situ & Ex situ conservation • Conservation through tissue Culture
	SEC (ANY ONE)	ETHNOBOTANY	<ul style="list-style-type: none"> • To understand the concept, scope and objectives of Ethnobotany • Methodology of Ethnobotanical studies • Role of Ethnobotany in modern Medicine • Ethnobotany and legal aspects

GONDWANA UNIVERSITY, GADCHIROLI
PG IN M. S BOTANY (CBCS)

SEMESTER - I

PAPER CODE	THEORY/PRACTICAL	TITLE OF THE PAPER	CREDIT
PSCBOTT01	PAPER-I	MICROBIOLOGY, ALGAE AND FUNGI	4
PSCBOTT02	PAPER-II	BRYOPHYTES AND PTERIDOPHYTES	4
PSCBOTT03	PAPER-III	GYMNOSPERMS AND PALEOBOTANNY	4
PSCBOTT04	PAPER-IV	CYTOLOY AND GENETICS	4
Practical I PSCBOTP01	PRACTICAL-I	BASED ON THEORY PAPER 1 AND 2	4
Practical II PSCBOTP02	PRACTICAL –II	BASED ON THEORY PAPER 3 AND 4	4
Seminar 1		SEMINAR 1	1

SEMESTER - II

PAPER CODE	THEORY/PRACTICAL	TITLE OF THE PAPER	CREDIT
PSCBOTT05	PAPER-V	PLANT PHYSIOLOGY AND BIOCHEMISTRY	4
PSCBOTT06	PAPER-VI	PLANT DEVELOPMENT AND REPRODUCTION	4
PSCBOTT07	PAPER-VII	CELL AND MOLECULAR BIOLOGY -I	4
PSCBOTT08	PAPER-VIII	ANGIOSPERMS –I	4
Practical I PSCBOTP03	PRACTICAL-III	BASED ON THEORY PAPER 5 AND 6	4
Practical II PSCBOTP04	PRACTICAL –IV	BASED ON THEORY PAPER 7 AND 8	4
Seminar 2		SEMINAR 2	1

SEMESTER - III

PAPER CODE	THEORY/PRACTICAL	TITLE OF THE PAPER	CREDIT
PSCBOTT09	PAPER-IX	PLANT ECOLOGY	4
PSCBOTT10	PAPER-X	CELL AND MOLECULAR BIOLOGY- II	4
PSDBOTT11	PAPER-XI	REPRODUCTIVE BIOLOGY OF ANGIOSPERM-I	4
PSDBOTT12 (SEC)	PAPER-XII	PLANT DIVERSITY AND HUMAN WELFARE-I	4
Pract-V PSCBOTP05	PRACTICAL-V	BASED ON THEORY PAPER PSCBOTT09 & PSCBOTT10	4
Pract-VI PSDBOTP06	PRACTICAL –VI	BASED ON THEORY PAPER PSCBOTT11 & PSCBOTT12	4
Seminar 3		SEMINAR 3	1

SEMESTER - IV

PAPER CODE	THEORY/PRACTICAL	TITLE OF THE PAPER	CREDIT
PSCBOTT13	PAPER-XIII	PLANT BIOTECHNOLOGY	4
PSCBOTT14	PAPER-XIV	ANGIOSPERMS – II	4
PSCBOTT15	PAPER-XV	REPRODUCTIVE BIOLOGY OF ANGIOSPERMS II	4
PSCBOTT16 (SEC)	PAPER-XVI	PLANT DIVERSITY AND HUMAN	4

		WELFARE-II	
Pract-VII PSCDBOTP07	PRACTICAL-VII	BASED ON THEORY PAPER PSCBOTT13, PSCBOTT14 & PSCBOTT15	4
Pract-VIII PSCDBOTP08	PRACTICAL -VIII	PROJECT	4
Seminar 4		SEMINAR 4	1

Scheme of Marks of Theory and Practical

Semester	Paper code	Theory/ practical	Title	Marks		Total
				University Exam	Internal Assessment	
I	PSCBOTT01	PAPER-I	MICROBIOLOGY, ALGAE AND FUNGI	80	20	100
	PSCBOTT02	PAPER-II	BRYOPHYTES AND PTERIDOPHYTES	80	20	100
	PSCBOTT03	PAPER-III	GYMNOSPERMS AND PALEOBOTANNY	80	20	100
	PSCBOTT04	PAPER-IV	CYTOLOY AND GENETICS	80	20	100
	Practical I PSCBOTP01	PRACTICAL-I	BASED ON THEORY PAPER 1 AND 2	80	20	100
	Practical II PSCBOTP02	PRACTICAL – II	BASED ON THEORY PAPER 3 AND 4	80	20	100
	Seminar 1		SEMINAR 1	25	-	25
II	PSCBOTT05	PAPER-V	PLANT PHYSIOLOGY AND BIOCHEMISTRY	80	20	100
	PSCBOTT06	PAPER-VI	PLANT DEVELOPMENT AND REPRODUCTION	80	20	100
	PSCBOTT07	PAPER-VII	CELL AND MOLECULAR BIOLOGY –I	80	20	100
	PSCBOTT08	PAPER-VIII	ANGIOSPERMS –I	80	20	100
	Practical III PSCBOTP03	PRACTICAL- III	BASED ON THEORY PAPER 5 AND 6	80	20	100
	Practical IV PSCBOTP04	PRACTICAL – IV	BASED ON THEORY PAPER 7 AND 8	80	20	100
	Seminar 2		SEMINAR 2	25	-	25
	III	PSCBOTT09	PAPER-IX	PLANT ECOLOGY	80	20
PSCBOTT10		PAPER-X	CELL AND MOLECULAR BIOLOGY-II	80	20	100
PSDBOTT11		PAPER-XI SPECIAL- 1(DSE-I)	REPRODUCTIVE BIOLOGY OF ANGIOSPERMS-I	80	20	100
PSSBOTT12		Foundation 1 (SEC-I)	PLANT DIVERSITY AND HUMAN WELFARE-I	80	20	100
Pract-V PSCBOTP05		PRACTICAL – V	BASED ON THEORY PAPER PSCBOTT09 & PSCBOTT10	80	20	100
Pract-VI PSDBOTP06		PRACTICAL – VI	BASED ON THEORY PAPER PSCBOTT11 & PSCBOTT12	80	20	100
Seminar 3			SEMINAR 3	25	-	25
IV	PSCBOTT13	PAPER-XIII	PLANT BIOTECHNOLOGY	80	20	100
	PSCBOTT14	PAPER-XIV	ANGIOSPERMS – II	80	20	100

	PSDBOTT15	PAPER-XV SPECIAL- 2(DSE-II)	REPRODUCTIVE BIOLOGY OF ANGIOSPERMS II	80	20	100
	PSSBOTT16	Foundation 2 (SEC-II)	PLANT DIVERSITY AND HUMAN WELFARE-II	80	20	100
	PRACT-VII PSCDBOTP07	PRACTICAL- VII	BASED ON THEORY PAPER PSCBOTT13, PSCBOTT14 & PSCBOTT15	80	20	100
	PRACT-VIII PSCDBOTP08	PRACTICAL- VIII	PROJECT	80	20	100
	Seminar 4		SEMINAR 4	25	-	25

Course specific outcomes M.Sc.Botany

Semester	Title	Course specific outcomes
I	MICROBIOLOGY, ALGAE AND FUNGI	<ul style="list-style-type: none"> • Students will understand the history and contribution of various microbiologists for mankind. • General characteristic and reproduction , economic importance of Archaeobacteria and eubacteria. • Criteria for classification of algae and fungi. • Students will learn the comparative study, classification and evolutionary trends in the various classes of fungi. • Detailed study of diseases by Plant pathogens with symptoms, causal organisms and their control.
	BRYOPHYTES AND PTERIDOPHYTES	<ul style="list-style-type: none"> • General characters, distribution, classification and ecology of Bryophytes and Pteridophytes. • Learn more about the series of Evolution in stele, heterospory and seed habit.
	GYMNOSPERMS AND PALEOBOTANY	<ul style="list-style-type: none"> • Students will learn the evolution of Gymnosperms and Angiosperms with various fossil records; process of fossilization and geological time scale. • General account, distribution, origin, systems of classification and economic importance of Gymnosperms. • Comparative study of vegetative and reproductive parts of some selected genus of Gymnosperms.
	CYTOLOGY AND GENETICS	<ul style="list-style-type: none"> • General understanding of chromosomal inheritance, linkage, deviation from Mendal's findings. • Sex determination and dosage compensation in plants. • Chromosome structure and packaging of DNA. Function of rRNA genes, karyotypes analysis and evolution. Specialized types of chromosomes. • Will understand the causes and effects of structural changes in chromosome. Inversion and translocation in heterozygotes. • Causes and consequences of mutation in plants. The types of mutation and use of different mutagenic agent in crop

		<p>improvement.</p> <ul style="list-style-type: none"> • Concept of Epigenetics and how it causes the change in phenotype without changing genotype and its role in various human diseases.
I	BASED ON THEORY PAPER 1 AND 2	<ul style="list-style-type: none"> • Practical based on paper 1 and 2
	BASED ON THEORY PAPER 3 AND 4	<ul style="list-style-type: none"> • Practical based on paper 3 and 4
	SEMINAR 1	<ul style="list-style-type: none"> • Improve the presentation skill, handling of ICT based tools. • Use of educational videos for making topic very clear and comprehensive.
II	PLANT PHYSIOLOGY AND BIOCHEMISTRY	<ul style="list-style-type: none"> • Will emphasis the importance of plant physiology and biochemistry. • Role of photosynthesis, evolution of photosynthetic apparatus and various pathways involved in photosynthesis. • Will understand the concept of respiration and various pathways involved in energy release. • Will learn the biosynthetic pathways of primary metabolites and also how they are broken down and the enzymes involved in the process. • Understand the process of amino acid metabolism; assimilation of sulfur, phosphate and nitrogen; biological nitrogen fixation and role of nif gene. • Solute transport and photo-assimilated translocation in plants.
	PLANT DEVELOPMENT AND REPRODUCTION	<ul style="list-style-type: none"> • Students will understand the kinetics of growth and growth patterns. • Theory of shoot and root apical meristem- SAM and RAM • Application of plant growth regulators in plant morphogenesis. • Physiology and genetics in flowering and mechanism of pollination. • Developmental process in male and female gametophytes and gene expression in pollen pistil interaction. • Biochemical and hormonal control of seed development and germination. • Learn the concept of senescence and programmed cell death (PCD); metabolic

		changes associated with PCD, senescence and its regulation.
	CELL AND MOLECULAR BIOLOGY-I	<ul style="list-style-type: none"> • It will give an insight on the process of biogenesis. • Structure and function of cell wall, plasma membrane, plasmodesmata and cellular organelles. • In detail study of cell division, DNA structure, forms and replication in prokaryote and eukaryote. • Molecular biology of stress responses in plants. Defense mechanism and modulation of metabolism, induction of genes in response to different stresses.
	ANGIOSPERMS-I	<ul style="list-style-type: none"> • Learn the origin and evolution of Angiospermic characters their floral adaptations to different pollinators. • Understand the scope, aims, principles and historic development of plant taxonomy. • Relative merits and demerits of major systems of classification. • Role of various taxonomic tools including biochemical as well as molecular tools in plant identification. Use of computer and GIS. • Study the biosystematics, numerical taxonomy in plant characterization. • Nomenclature of plants, salient features and role of ICBN.
	BASED ON THEORY PAPER 5 AND 6	<ul style="list-style-type: none"> • Practical based on paper 5 and 6
	BASED ON THEORY PAPER 7 AND 8	<ul style="list-style-type: none"> • Practical based on paper 7 and 8
	SEMINAR 2	<ul style="list-style-type: none"> • Improve the presentation skill, handling of ICT based tools. • Use of educational videos for making topic very clear and comprehensive.
III	PLANT ECOLOGY	<ul style="list-style-type: none"> • Course provides them comprehensive understanding about vegetation organization & its development • Ecosystem organization & Global biogeochemical cycles • Air, Water and Soil pollution & Climate change • Ecosystem stability & Ecological management

	CELL AND MOLECULAR BIOLOGY-II	<ul style="list-style-type: none"> • Course provides them comprehensive understanding about Central Dogma of Biology • Gene structure and expression & protein sorting • Genome organization in prokaryotes and eukaryotic organelles • Genetic recombination and genetic mapping • Cell cycle and apoptosis • Signal transduction & Techniques in cell biology
	REPRODUCTIVE BIOLOGY OF ANGIOSPERM-I (DSE-I)	<ul style="list-style-type: none"> • Course provides them comprehensive & detail understanding about reproductive system in Angiosperm • Anther –structure,microsporogenesis and its molecular developmental aspect • Male gametophyte development and pollen with Physiological and biochemical aspect • Pistill & Megasporogenesis, cytoskeleton of the embryo sac • Pollination in detail, biochemistry of Pollen-pistil interaction & Incompatibility
	PLANT DIVERSITY AND HUMAN WELFARE-I (SEC-I)	<ul style="list-style-type: none"> • Course provides them comprehensive understanding about Plant diversity and its scope • Students gain knowledge of Values and uses of Biodiversity • Understanding of Loss of Biodiversity at various levels • Management of Plant Biodiversity, Methodology for execution & legislation
	PRACTICAL –V	<ul style="list-style-type: none"> • Practical based on paper 9 & 10
	PRACTICAL –VI	<ul style="list-style-type: none"> • Practical based on paper 11 and 12
	SEMINAR	<ul style="list-style-type: none"> • Improve the presentation skill, handling of ICT based tools. • Use of educational videos for making topic very clear and comprehensive.
IV	PLANT BIOTECHNOLOGY	<ul style="list-style-type: none"> • Students gain knowledge about various tools & techniques used in Recombinant DNA technology & Genetic engineering of plants • Microbial genetic manipulation &

		<p>Genomics and proteomics</p> <ul style="list-style-type: none"> • Students gains knowledge about Plant tissue culture, Transgenic production • Bioinformatics, Learns various aspects of Database. • Data analysis, prediction and submission tools and their uses.
	ANGIOSPERM-II	<ul style="list-style-type: none"> • Course provides students comprehensive understanding about distinguished characters, floral variation and evolution, affinities of primitive , modern monocot & dicot families • primitive living angiosperms, speciation and extinction & global pattern of biodiversity • Biological diversity concept and levels
	REPRODUCTIVE BIOLOGY OF ANGIOSPERMS II (DSE II)	<ul style="list-style-type: none"> • Understanding of Angiospermic Fertilization & endosperm in detail • Embryogenesis & Polyembryony • Phenomenon of apomixis, parthenocarpy & Mellitopalynology • Concept and scope of biotechnology in angiosperm • Biotransformation and production of useful compounds
	PLANT DIVERSITY AND HUMAN WELFARE-II (SEC II)	<ul style="list-style-type: none"> • Conservation of Biodiversity • Social approaches & awareness programmes • Understand the Role of plants in relation to Human Welfare at different aspects
	PRACTICAL VII	<ul style="list-style-type: none"> • BASED ON THEORY PAPER XIII, XVI & XV
	PRACTICAL VIII PROJECT	<ul style="list-style-type: none"> • Get acquainted with Research • Make research proposal • data collection & fieldwork • Basic or Experimental work • Understand the process of data analysis
	SEMINAR 4	<ul style="list-style-type: none"> • Improve the presentation skill, handling of ICT based tools. • Use of educational videos for making topic very clear and comprehensive.